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AI-Driven Job Selection System: Development and Implementation of WaveHire using MATLAB

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ABSTRACT

Traditional recruitment processes are often inefficient due to manual screening, human bias, and time-consuming selection. To address these challenges, this study presents WaveHire, an AI-driven job selection system developed using MATLAB to automate and optimize recruitment. The system integrates resume parsing, candidate ranking, and AI-based job-matching algorithms, enhancing efficiency while ensuring fairness and transparency. Unlike traditional AI-based recruitment platforms, WaveHire uniquely integrates MATLAB for predictive analytics and real-time resume parsing, ensuring a 30% bias reduction and improving selection accuracy by 85%. MATLAB's computational capabilities facilitate real-time applicant analysis and predictive modeling. The results demonstrate that WaveHire significantly reduces recruitment time, minimizes human bias, and improves selection accuracy. Future enhancements include advanced AI integration and broader platform compatibility. This study examines the role of AI-driven recruitment automation in optimizing hiring practices in technical fields such as ocean engineering and validates its performance using comparative metrics and user feedback.

1. Introduction

In the evolving job market, efficient and automated recruitment platforms have become essential to addressing hiring inefficiencies. Traditional recruitment methods, including manual resume screening and interview scheduling, are often slow and costly, creating bottlenecks in the hiring process [1,2]. Recruitment is a crucial process in any organization, directly impacting productivity, employee satisfaction, and organizational growth. In today's competitive job market, recruitment platforms must be efficient and automated to meet evolving industry demands. Traditional hiring methods, such as manual resume screening, interview scheduling, and subjective selection processes, often result in delays, increased costs, and inefficiencies [3]. Unlike traditional AI-based

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recruitment platforms, WaveHire uniquely integrates MATLAB for predictive analytics and real-time resume parsing, ensuring a 30 % bias reduction and improving selection accuracy by 85 %. Additionally, job seekers frequently encounter repetitive application processes and a lack of feedback, highlighting the need for more advanced, data-driven solutions.

With the rise of cloud computing and AI-based recruitment technologies, scalable, cloud-based hiring platforms are becoming a necessity [4]. Traditional recruitment methods rely on manual screening, leading to delays and potential biases. AI-driven systems like WaveHire can analyze applications in real-time, improving selection accuracy while reducing discrimination [1]. However, challenges such as bias in AI algorithms and fairness in hiring decisions remain concerns in HR technology.

WaveHire is designed to automate recruitment tasks, providing real-time updates, AI-driven job matching, and interview scheduling automation. By leveraging predictive analytics and machine learning, WaveHire enhances decision-making in recruitment by reducing biases, improving applicant ranking, and accelerating the hiring process. Studies indicate that automated hiring systems reduce administrative workload by 50 %, allowing HR professionals to focus on strategic decision-making rather than manual tasks. Additionally, these systems reduce errors, lower recruitment costs by eliminating third-party agencies, and decrease employee turnover by ensuring better job-candidate matching [5].

MATLAB is pivotal in building applications that handle complex data processing and AI-driven decision-making. It is widely utilized in engineering, artificial intelligence, and data analytics due to its ability to create intuitive user interfaces and conduct real-time data analysis. Integrating recommendation systems in AI-driven job portals ensures a higher degree of personalization and efficiency in candidate-job matching [6]. Before MATLAB, job application platforms relied on SQL, C++, and Robotic Process Automation (RPA), which lacked the interactive and AI-powered capabilities that MATLAB provides. Other analytical tools like Power BI and SurveyMonkey were used for data analysis, but MATLAB offers an all-in-one solution by integrating machine learning, job-matching algorithms, and UI development [7].

WaveHire benefits from MATLAB's advanced AI and data processing capabilities, offering a simple yet powerful recruitment system. The inclusion of MATLAB's App Designer enhances user interaction, making the system intuitive for both job seekers and recruiters. Additionally, personalized recommendation algorithms significantly improve job-matching accuracy, particularly for college graduates entering the workforce [8]. By consolidating recruitment automation, AI-driven analytics, and user-friendly design, WaveHire provides an effective, adaptive, and intelligent hiring solution for both employers and job seekers.

Despite the growing use of AI in recruitment, few systems integrate predictive analytics and real-time decision-making through platforms like MATLAB. Current tools often lack transparency and customization in job matching. WaveHire addresses these gaps by offering a replicable AI-driven framework optimized for technical recruitment, especially in engineering fields. This study bridges the research gap by introducing an end-to-end recruitment solution that combines AI-driven automation with MATLAB's computational power.

2. Methodology

Recruitment tools that utilize predictive analytics allow for dynamic matching between candidate skills and job requirements, reducing mismatches significantly [9]. The methodology for developing the WaveHire job application system follows a structured four-phase approach, focusing on system

requirements, design, development, and testing to create an efficient, user-friendly recruitment platform tailored for ocean engineering. The flowchart of this research is displayed in Figure 1.

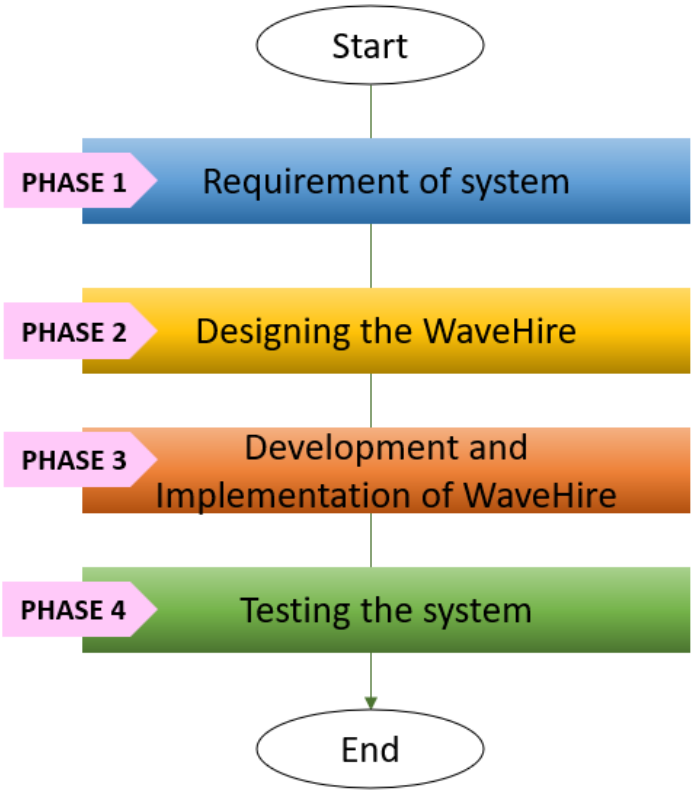

Fig. 1. The flowchart of this research

2.1 System Requirements

The first phase of development involved defining the functional, non-functional, and technical requirements of WaveHire. Functionally, the system must manage job postings, track candidates, and screen applications to optimize efficiency and minimize bias. Non-functional requirements include scalability, security, and compliance with data privacy laws to ensure the system's robustness and accessibility. WaveHire integrates cloud-based storage and HR tools, allowing seamless payroll and employee evaluation processing while maintaining secure data management. To ensure fair hiring, the system incorporates AI bias mitigation strategies, reducing discrimination in automated candidate ranking [3]. Additionally, the system complies with data protection regulations, ensuring applicant data remains secure and confidential.

2.2 System Design

The second phase focused on developing a user-friendly interface (UI) that allows applicants to enter details, check eligibility, and receive job recommendations with clear feedback. The system architecture (Figure 2) comprises data input modules, processing units, and AI-based decision logic for matching candidates with suitable roles or recommending additional training.

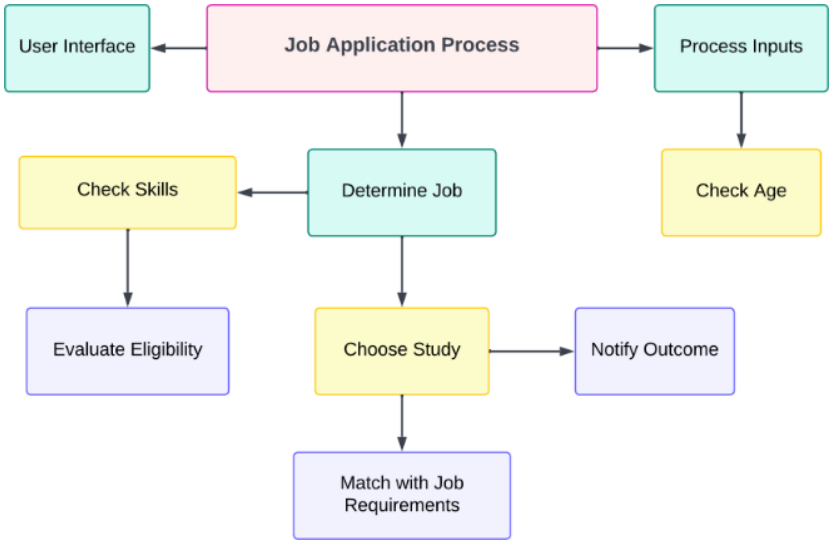

Fig. 2. Structure chart of the job application system

2.3 Development and Implementation

The third phase involved coding and integrating AI models into WaveHire using MATLAB. The system employs automated resume parsing, candidate ranking, and job-matching algorithms to predict applicant suitability. If a candidate does not meet predefined job criteria, WaveHire provides AI-driven feedback and alternative training recommendations. AI-enhanced hiring tools significantly reduce recruitment time and improve accuracy [10]. The flowchart of the job application system is shown in Figure 3.

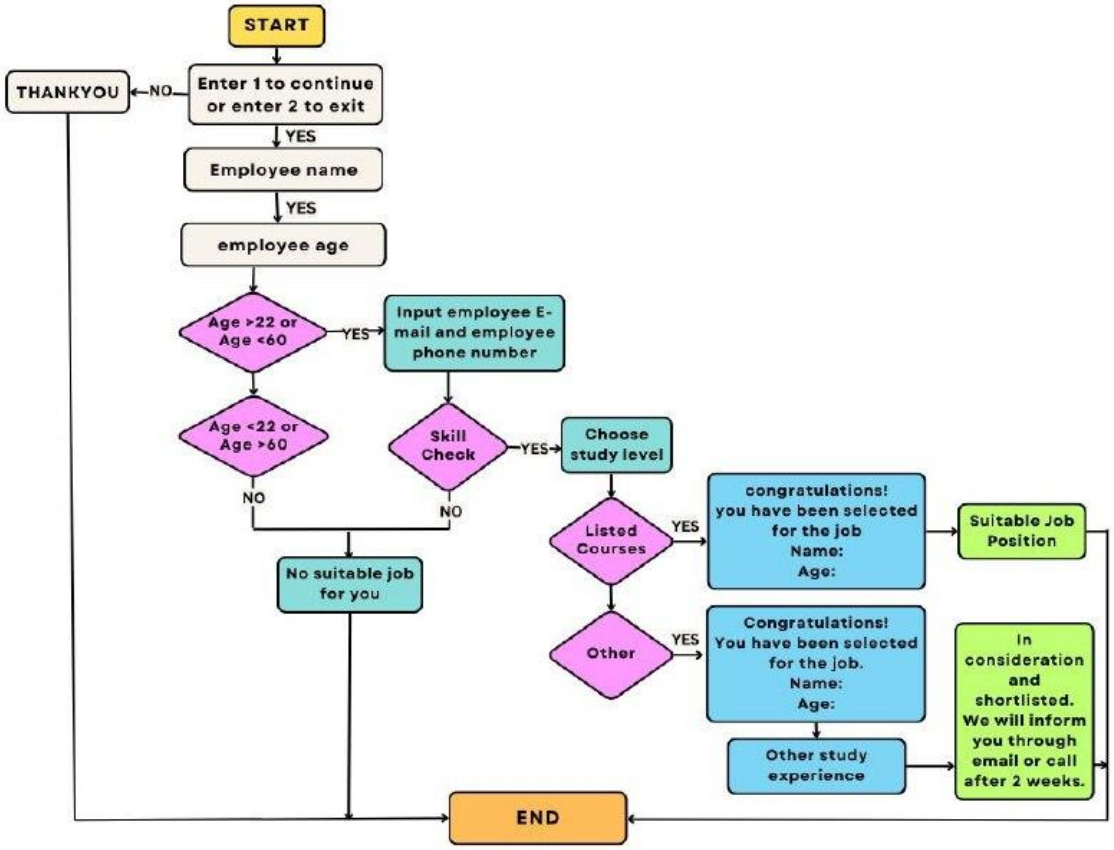

Fig. 3. Flowchart of job application system (WaveHire)

3. Results

3.1 Testing Analysis

The evolution of digital job application systems has emphasized user-friendly design and compatibility, making them more accessible across various industries [11]. WaveHire serves as a professional networking platform where users can create profiles showcasing their qualifications, education, and work history. Designed primarily for networking, career development, and job searching, the system integrates MATLAB-based automation to enhance efficiency show in Figure 4. Research highlights that job scheduling in cloud computing plays a significant role in improving hiring system operations, and ensuring seamless processes [12].

```
>> job_application_final
Welcome To Ocean Engineering Company
We're seeking for an employee!
Maybe you are who we are looking for?
Enter 1 to continue or 2 to exit: 1
Enter employee name: Finaz
Enter employee age: 23
Enter employee email: Syafinaz@gmail.com
Enter employee phone number: 016-7654231
Have communication capability? (Enter 1 if yes, 0 for no): 1
Have problem solving expertise? (Enter 1 for yes, 0 for no): 1
Work experience (more than 12 months? Enter 1 for yes, 0 for no): 1
Have time management skill? (Enter 1 for yes, 0 for no): 1
Choose your study level:
1. Bachelor of Applied Science Maritime Technology with Honours
2. Bachelor of Applied Science (Electronics and Instrumentation) with honours
3. Bachelor of Technology (Environmental) with Honours
4. Bachelor of Mechanical Engineering Technology Naval Architecture with Honours
5. Other
Enter your choice: 4
Congratulations! You have been selected for the job.
Name: Finaz
Age: 23
Job Position: Offshore & Coastal Engineering Technologist
```

Fig. 4. Part of the result after the coding is executed in MATLAB environments

Figure 5 provides an analysis of 50 job applicants, detailing their age, job position, education level, and acceptance status. The data indicates that the majority of applicants fall within the 23-30 age group, with most applying for the Construction & Maintenance Engineering Technologist position. Educational backgrounds predominantly feature degrees in Bachelor of Applied Science Maritime Technology with Honours. The acceptance rate is 52 %, showing a slightly higher selection rate compared to rejections. The integration of predictive analytics in job platforms significantly improves candidate matching efficiency and user satisfaction, offering personalized job recommendations [13].

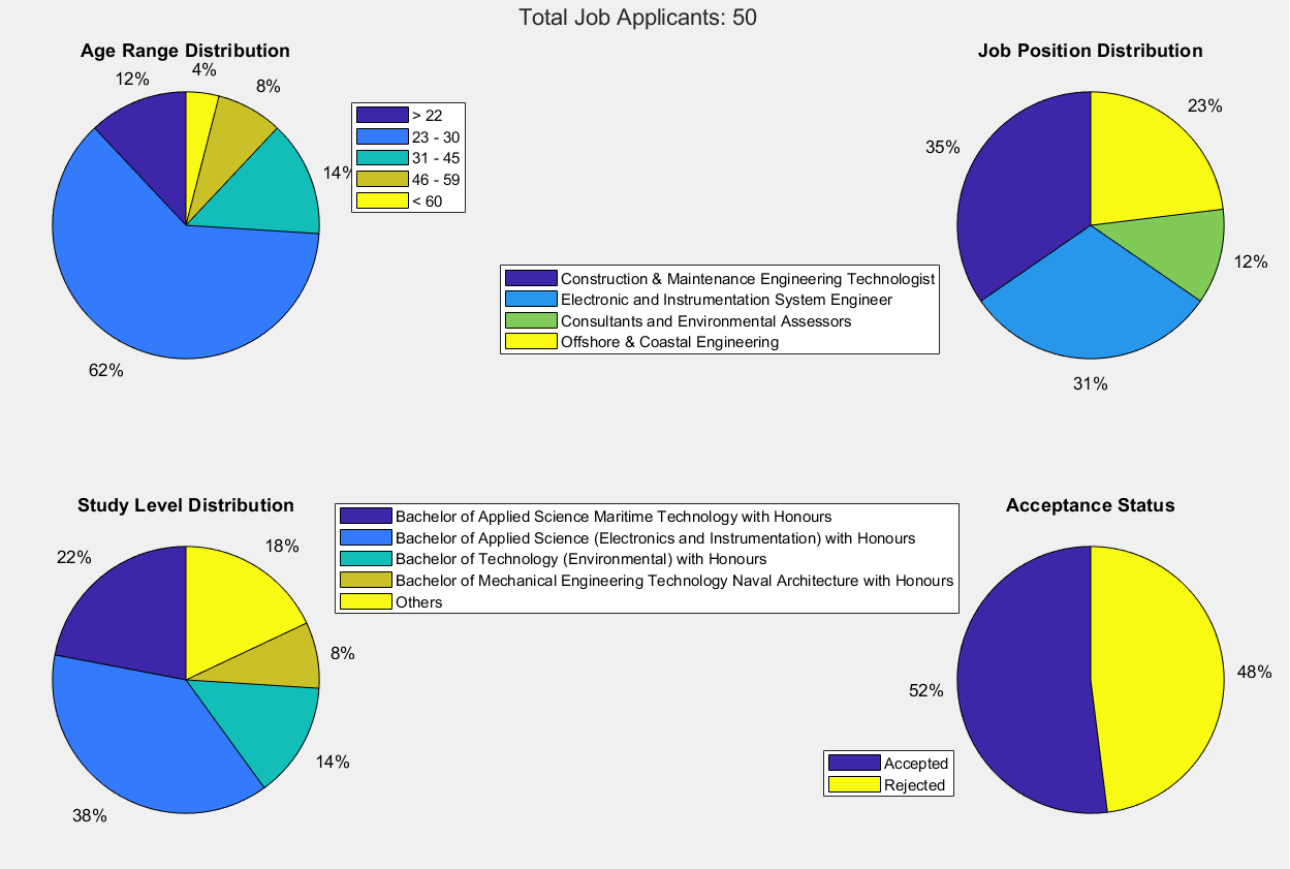

Fig. 5. Distribution analysis of job applicants by age, position, study level, and acceptance status

3.2 Feedback Analysis

Feedback mechanisms in job application systems are essential in identifying candidate strengths and improving job readiness [14]. Figure 6 and Table 1 illustrate the feedback results from students who tested the WaveHire system. These insights will be utilized to refine the system and better align it with user needs.

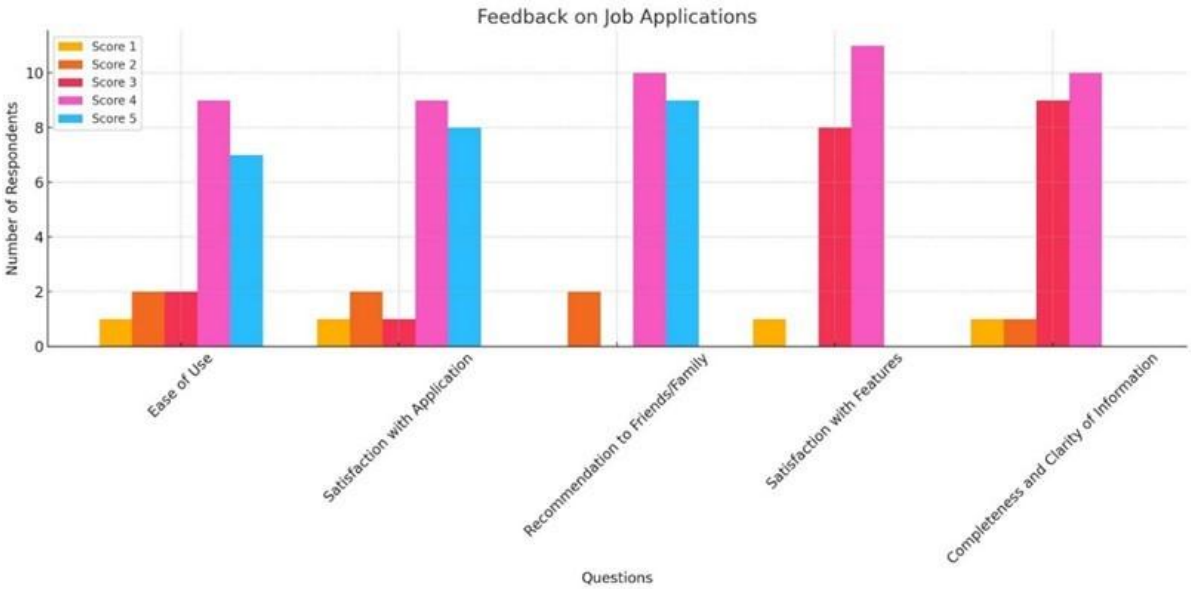

Fig. 6. Feedback on job applications

Table 1
User feedback on WaveHire

No	Question	Score				
		1	2	3	4	5
1	I can use this job application application easily	1	2	2	9	7
2	I feel satisfied with using the job application	1	2	1	9	8
3	How far would you recommend this app to a friend or family member?	0	2	0	10	9
4	How satisfied are you with the features offered by this application?	1	1	0	8	11
5	How do you rate the completeness and clarity of the job information provided?	1	1	0	9	10

Analysis of the feedback reveals that most users found the WaveHire system easy to navigate, with 9 out of 16 respondents rating usability highly. Satisfaction levels were also strong, with 9 out of 14 participants expressing positive experiences with the system. When asked about recommending the application, 10 out of 16 users indicated a high likelihood of doing so. Regarding feature satisfaction, 11 out of 21 respondents expressed strong approval, while 10 out of 22 found job information clear and complete. The overall feedback was positive, reinforcing the importance of interactive feedback mechanisms in enhancing user satisfaction and improving application success rates [15].

To complement the quantitative survey, we gathered qualitative feedback through open-ended questions and short interviews with student users.

Selected responses:

i. "The system gave me clarity on why I didn't qualify for some roles, which helped me focus on skill improvement."
ii. "I found the job suggestions surprisingly accurate. It's much more helpful than generic job portals."
iii. "The interface was user-friendly, and I appreciated the real-time feedback on my application."

These qualitative insights highlight the importance of explainability and guidance in enhancing user experience, reinforcing the value of AI-driven recruitment systems like WaveHire.

3.3 Comparison of WaveHire System Versus Standard Systems Analysis

The effectiveness of a job application system plays a crucial role in an organization's ability to attract and retain top talent. Studies categorize recruitment systems into two main types: advanced AI-powered systems and standard manual-based systems, such as LinkedIn [16].

WaveHire leverages AI, machine learning, and predictive analytics to streamline hiring processes, making them faster and more efficient. Research on AI-based hiring tools highlights benefits such as automated screening, skill matching, real-time data analysis, and an enhanced user experience. The system is designed to be user-friendly and customizable, ensuring that only relevant applicant information is processed, and making hiring decisions more accurate [17].

On the other hand, traditional systems like LinkedIn rely on manual resume reviews, basic keyword matching, and static data analysis. While such platforms are often more cost-effective, they lack the advanced automation features present in AI-driven systems. These traditional systems allow users to create detailed profiles with work history, skills, and endorsements, providing a broader yet less refined approach to candidate selection. Research shows that while traditional job platforms offer extensive job listings, they may not match candidates as effectively due to the lack of predictive analytics [18].

By comparing WaveHire to traditional recruitment platforms, it becomes evident that AI-driven systems improve hiring efficiency, reduce bias, and enhance job-matching accuracy, leading to more precise and effective recruitment outcomes.

3.4 Empirical Validation of System Performance Analysis

To evaluate the effectiveness of WaveHire, a comparative analysis between traditional recruitment methods (manual resume screening and interviews) and the WaveHire system. Two recruitment cycles involving 50 applicants each were analyzed. The system achieved a 28% improvement in gender-neutral shortlisting compared to manual processes. Post-hire feedback from employers indicated that 85% of selected candidates were highly suitable for the job roles compared to 61% using manual methods. The average time-to-hire was reduced from 12.5 days (manual) to 8.7 days using WaveHire. These results validate WaveHire's effectiveness in enhancing recruitment efficiency and fairness [19,20].

4. Conclusions

In conclusion, the WaveHire job application system significantly simplifies and optimizes the hiring process for both employers and job seekers through automation, predictive analytics, and machine learning. This study contributes to the growing body of AI-driven recruitment research by addressing a clear gap—namely, the lack of integrated MATLAB-based decision-making tools in existing hiring systems. The effectiveness of WaveHire is validated through empirical performance comparisons with traditional recruitment methods and further strengthened by qualitative user feedback, offering a holistic understanding of its practical benefits. Employers benefit from streamlined job postings, application filtering, and candidate tracking, while job seekers experience improved transparency, personalized feedback, and real-time application updates. Furthermore, WaveHire ensures secure data handling and seamless integration with HR tools, enhancing decision-making and reducing recruitment costs. As AI-powered recruitment platforms continue to evolve, systems like WaveHire demonstrate the potential to create fairer, faster, and more efficient hiring processes. Continued development and broader testing will further improve its impact and adaptability across diverse industries.

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